

What is claimed is:

1. A hydrostatic release mechanism for releasing an emergency device from a vessel, the hydrostatic release mechanism comprising:

a sealed housing having an interior volume, the sealed housing having a tunnel passing therethrough, said tunnel adapted to receive a tether extending therethrough,

a depth sensor mounted to the sealed housing, the depth sensor having a diaphragm covering an opening between the interior volume and a diaphragm cover extending over the diaphragm opposite the interior of the sealed housing, the diaphragm cover having one or more passages therethrough which provide liquid communication between the exterior of the depth sensor and a small cavity defined by the diaphragm and the diaphragm cover,

a trigger contained within the sealed housing, the trigger having a trigger pin, a plunger and a preloaded spring which are connected to the diaphragm, the preloaded spring resiliently urging said diaphragm outwardly from the interior volume with an outward force,

a firing mechanism contained within the sealed housing, the firing mechanism being actuated by movement of the plunger in response to inward movement of the diaphragm when the pressure on the diaphragm exceeds the outward force, the firing mechanism having a hammer which is driven against a pyrotechnic cartridge, the pyrotechnic cartridge being mounted at one end of a barrel, the pyrotechnic cartridge firing and emitting expanding gases which are contained within the barrel, a piston mounted at the other end of the barrel, the piston moving in response to the expanding gases, the piston having a blade mounted thereon opposite the pyrotechnic cartridge whereby the force of the expanding gases is transferred to the blade via the piston, the blade being guided to pass perpendicularly through the tunnel to thereby sever the tether.

2. The hydrostatic release mechanism of claim 1 wherein the sealed housing comprises an upper portion joined to a lower portion by a plurality of bolts to form the interior volume.

3. The hydrostatic release mechanism of claim 2 further comprising a gasket captured between the peripheries of the upper portion and the lower portion.

4. The hydrostatic release mechanism of claim 1 wherein the sealed housing comprises an upper portion joined to a lower portion by ultrasonic welding to form the interior volume.

5. The hydrostatic release mechanism of claim 4 further comprising a gasket captured between the peripheries of the upper portion and the lower portion.

6. The hydrostatic release mechanism of claim 1 wherein the tunnel is a continuous cylinder which is integral with the sealed housing, the tunnel being thin and frangible.

7. The hydrostatic release mechanism of claim 1 further comprising a diaphragm frame defining the opening, the diaphragm cover and the diaphragm being secured to the diaphragm frame a plurality of bolts extending through the periphery of the diaphragm frame, the diaphragm and the diaphragm cover.

8. The hydrostatic release mechanism of claim 1 whereby the outward force is predetermined by electing a trigger depth whereby the water pressure at the trigger depth times the area of the diaphragm exceeds the upward force.

9. The hydrostatic release mechanism of claim 1 wherein the firing mechanism further comprises a latch which is restrained from rotational movement by the plunger when the outward force exceeds the pressure on the diaphragm, the latch restraining the hammer from movement until said plunger is moved a sufficient distance by the trigger pin when the outward force is less than the pressure on the diaphragm whereby the latch is no longer restrained and moves under the urging of the hammer which is driven against the pyrotechnic cartridge at the urging of a firing spring.

10. The hydrostatic release mechanism of claim 1 further comprising a blade barrier positioned along one side of the tunnel opposite the blade to prevent said blade from puncturing through the housing.

11. A hydrostatic release mechanism for releasing an emergency device from a vessel, the hydrostatic release mechanism comprising:

a sealed housing comprises an upper portion joined to a lower portion to form an interior volume, a gasket captured between the peripheries of the upper portion and the lower portion, the sealed housing having a tunnel passing therethrough, said tunnel adapted to receive a tether extending therethrough, the tunnel being a continuous cylinder which is integral with the sealed

housing, the tunnel being thin and frangible,

a depth sensor mounted to the sealed housing, the depth sensor having a diaphragm covering an opening between the interior volume and a diaphragm cover extending over the diaphragm opposite the interior of the sealed housing, the diaphragm cover having one or more passages therethrough which provide liquid communication between the exterior of the depth sensor and a small cavity defined by the diaphragm and the diaphragm cover, a diaphragm frame defining the opening, the diaphragm cover and the diaphragm being secured to the diaphragm frame a plurality of bolts extending through the periphery of the diaphragm frame, the diaphragm and the diaphragm cover,

a trigger contained within the sealed housing, the trigger having a trigger pin, a plunger and a preloaded spring which are connected to the diaphragm, the preloaded spring resiliently urging said diaphragm outwardly from the interior volume with an outward force, the outward force is predetermined by electing a trigger depth whereby the water pressure at the trigger depth times the area of the diaphragm exceeds the upward force,

a firing mechanism contained within the sealed housing, the firing mechanism being actuated by movement of the plunger in response to inward movement of the diaphragm at the trigger depth when the pressure on the diaphragm exceeds the outward force, the firing mechanism having a hammer which is driven against a pyrotechnic cartridge, the pyrotechnic cartridge being mounted at one end of a barrel, the pyrotechnic cartridge firing and emitting expanding gases which are contained within the barrel, a piston mounted at the other end of the barrel, the piston moving in response to the expanding gases, the piston having a blade mounted thereon opposite the pyrotechnic cartridge whereby the force of the expanding gases is transferred

to the blade via the piston, the blade being guided to pass perpendicularly through the tunnel thereby severing a tether extending therethrough; and

a blade barrier positioned along one side of the tunnel opposite the blade to prevent said blade from puncturing through the housing.

12. The hydrostatic release mechanism of claim 11 wherein the firing mechanism further comprises a latch which is restrained from rotational movement by the plunger when the outward force exceeds the pressure on the diaphragm, the latch restraining the hammer from rotational movement until said plunger is moved a sufficient distance by the trigger pin when the outward force is less than the pressure on the diaphragm whereby the latch is no longer restrained and moves under the urging of the hammer which is driven against the pyrotechnic cartridge at the urging of a firing spring.

13 The hydrostatic release mechanism of claim 11 wherein the upper portion is joined to the lower portion by a plurality of bolts.

14 The hydrostatic release mechanism of claim 11 wherein the upper portion is joined to the lower portion by ultrasonic welding.